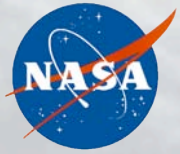

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V5 Validation Activities

Eric Fetzer

Jet Propulsion Laboratory, California Institute of Technology

AIRS Science Team Meeting, Caltech

17 April 2008

Eric.J.Fetzer@jpl.nasa.gov

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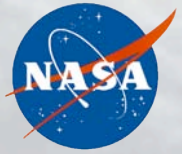
Pasadena, California

Overview

- **Why**
  - ***Ramesh on Tuesday: "Get ready for End of Prime Mission Review in October 2009."***
  - ***Validation was called out in Senior Review:*** ***"Current data products are in various stages of validation, but the AIRS products, being new and complex in nature, are lagging behind the development and dissemination of other Aqua measurements. The AIRS core data products ought to be brought to maturity prior to the end of the Prime mission in September 2008." (page 5)***
- **Where we are today.**
- **What's next.**

Eric.J.Fetzer@jpl.nasa.gov



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Aqua Project AIRS Validation Status
as of Senior Review in early 2007

Red: need more analysis

Blue: analyses planned

AIRS Product	Uncertainty Estimate (Version 5)	Val Status (Version 5)	Source
Radiances			
AIRS IR Radiance	<0.2%	Stage 3	Project
AIRS VIS/NIR Radiance	15-20%	Stage 1	Project
AMSU Radiance	1-3 K	Stage 3	Project
HSB Radiance	1-3 K	Stage 3	Project
Core Products			
Cloud Cleared IR Radiance	1.0 K	Stage 2	Project
Sea Surface Temperature **(high lat)**	1.0 K	Stage 2	Project
Land Surface Temperature **& emissivity**	2-3 K	Stage 1	Project
Temperature Profile	1 K / km	Stage 2	Project
Water Vapor Profile	15% / 2km	Stage 2	Project
Total Precipitable Water	5%	Stage 2	Project
Fractional Cloud Cover	20%	Stage 2	Project
Cloud Top Height	1 km	Stage 2	Project
Cloud Top Temperature	2.0 K	Stage 2	Project
Neccesary Products*			
Total Ozone Column	5%	Stage 2	Project
Ozone Profile	20%	Stage 2	Project
IR Dust**	0.5 K	Stage 1	Project
Research Products			
Carbon Monoxide	15%	Stage 2	NOAA/UMBC
Methane	2%	Stage 1	NOAA
Carbon Dioxide**	1-2 ppm	Stage 1	NASA/NOAA
OLR	5 W/m2	Stage 1	GSFC
HNO3**	0.2 DU	Stage 1	NOAA/UMBC
Sulfur Dioxide**	1 DU	Stage 1	NOAA/UMBC

*Necessary Products are required to retrieve accurate temperature profiles (1K/km) in all conditions

**Product not yet available in AIRS Level 2 Files. Products will be available in Version 6

Eric.J.Fetzer@jpl.nasa.gov

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What's been accomplished?

- **Over 30 publications dedicated to AIRS validation, including:**
  - ***Radiances.***
  - ***Low latitude SST.***
  - ***Low latitude temperature and humidity with sondes.***
  - ***Antarctic T and q with sondes.***
  - ***Water vapor comparisons with AMSR-E and MLS.***
  - ***Cloud comparisons with in situ, MODIS, MLS and CloudSat/CALIPSO.***

Eric.J.Fetzer@jpl.nasa.gov

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Several Recent Publications on AIRS Val.

April BAMS; see also recent Quarterly Journal

EAQUATE An International Experiment For Hyperspectral Atmospheric Sounding Validation

BY J. P. TAYLOR, W. L. SMITH, V. CUOMO, A. M. LARAR, D. K. ZHOU, C. SERIO, T. MAESTRI, R. RIZZI, S. NEWMAN, P. ANTONELLI, S. MANGO, P. DI GIROLAMO, F. ESPOSITO, G. GRIECO, D. SUMMA, R. RESTIERI, G. MASIELLO, F. ROMANO, G. PAPPALARDO, G. PAVESE, L. MONA, A. AMODEO, AND G. PISANI

The validation of advanced infrared sounding satellites requires a diverse set of coordinated synergistic observations utilizing ground-based and airborne instrumentation.

VOLUME 25

The Validation of AIRS Retrievals of Integrated Precipitable Water Vapor Using Measurements from a Network of Ground-Based GPS Receivers over the Contiguous United States

M. K. RAMA VARMA RAJA

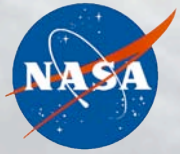
I. M. Systems Group, Inc., Kensington, Maryland

SETH I. GUTMAN

NOAA/Earth System Research Laboratory/Global Systems Division, Boulder, Colorado

JAMES G. YOE AND LARRY M. MCMILLIN

J. Atmos. Ocean. Tech., 2008



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What specific analyses are not yet completed (i.e., not published)?

- **Vis/NIR.**
- **High lat SST.**
- **Cloud cleared radiance.**
- **Microwave-only products.**
- **Land surface temperature and emissivity.**
- **Temperature and humidity profiles using all dedicated radiosondes**
  - ***Land and high northern latitudes, especially.***

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Correlative Data Activities

- **Efforts underway to support V5 validation:**
  - ***QA and standard format for ~2,000 dedicated radiosondes***
    - Bill Irion will describe those activities.
  - ***Assembling a high-resolution land emissivity data base***
    - Glynn Hulley will describe work being done with Simon Hook and Bob Knuteson.

- **What else could be done?**
  - ***Some in situ obs require PI-specific expertise (e. g., lidars and AERIs).***
  - ***Aircraft measurements have not been assembled systematically for Core Product validation***
    - Their utility for minor gases has been shown.
    - Aircraft were not part of Core Product val. plans.

Eric.J.Fetzer@jpl.nasa.gov

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What are priority analyses, and who has volunteered to write a paper in the next few months?

- **Cloud cleared radiance**
  - ***Larrabee Strow***
    - hear today's update by Sergio De Souza-Machado.
- **Surface temperature and emissivity**
  - ***Simon Hook and Bob Knuteson***
    - today's update by Glynn Hulley.
- **Profile quantities using dedicated radiosondes**
  - ***Antonia Gambacorta with Dave Tobin's ARM sondes.***
  - ***Several other analyses by Chris Barnet & team, including ozone by Murty Divakarla.***

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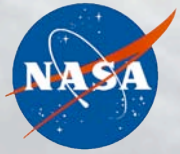

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Priority analyses, and who *in JPL AIRS team* has 'volunteered' to write papers?

- **High northern latitude T and q**
  - ***Hengchun Ye***
- **Mid latitude (Toulouse and Garmisch) T and q**
  - ***Joao Teixeira***
- **Shallow boundary layer over ocean (AEROSE, RICO sondes)**
  - ***Joao Teixeira***
- **Tropical upper trop water vapor (TICOsonde, Vömel sondes)**
  - ***Eric Fetzer***
- **Microwave-only water vapor profiles**
  - ***Evan Fishbein.***
- **Tropopause properties**
  - ***Baijun Tian***
- **Total water vapor in So. Cal. & Japan from ground-based GPS**
  - ***Stephanie Granger.***
- **Clouds**
  - ***Brian Kahn.***
- **Ozone**
  - ***Bill Irion.***

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In Closing: What about the End of Prime Mission Review?

- **A plan:**
  - ***Summarize the considerable literature on AIRS validation.***
  - ***Proceed with most of the analyses in previous two slides.***
  - ***Be as clear as possible about shortcomings and how they are being addressed.***
- **Volunteers needed.**

Eric.J.Fetzer@jpl.nasa.gov